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Remarks

This Amendment is responsive to the December 22, 2006 Final Office Action. Reexamination and reconsideration of claims 21-28 is respectfully requested.

Summary of The Office Action

Claims 21, 22, 23, 24, 25 and 28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Rumbut (U.S. Pat. No. 5,740,018)(Rumbut). Claims 24 and 28 have been amended.

Claim 26 was rejected under 35 U.S.C. §103(a) as being unpatentable over Quernemoen (US Pat. No. 6,453,169)(Quernemoen) in view of Rumbut.

Claim 27 does not appear to be explicitly rejected in the Final Office Action. However this may be a simple typographic error in the Final Office Action. Clarification of the status of claim 27 is requested. Applicant will assume that the Final Office Action intended to reject claim 27 under 35 U.S.C. §103(a) as being unpatentable over Rumbut.

The Claims Patentably Distinguish Over the References of Record

35 U.S.C. §103

To establish a prima facie case of 35 U.S.C. §103 obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. MPEP 2143.01 Second, there must be a reasonable expectation of success. MPEP 2143.02 Finally, the prior art reference must teach or suggest all the claim limitations. MPEP 2143.03 Additionally, an Office Action must only reluctantly take "Official Notice" concerning what would have been obvious, and then only when a reference can so easily be located that it would be trivial to do so.

Here, neither the first nor the third criteria described in MPEP 2143 are satisfied since none of the references, either alone or in combination teach or suggest all the claim limitations. Specifically, none of the references, alone and/or in combination, teach a system having a **detachably connected** liquid cooling module. Official Notice using the application as a

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blueprint has been used to modify the reference in a way unintended by the author of the reference. Thus, none of the claims are obvious for at least this reason.

Rumbut

Rumbut does not teach a liquid cooled modular electronics system that includes a **detachably connectable** liquid cooling module(s). Rumbut describes an assembly of cabinet 200, pipe 212, cooling module 250, and pipe 218 into which liquid cooled modules may be placed. Rumbut illustrates a fixedly connected external liquid cooling component 250 that is permanently attached (e.g., welded) to the cabinet 200. Component 250 is not illustrated being detachably connected to the cabinet 200. The Office Action, as it must in light of the permanent connection taught in the reference, agrees that Rumbut does not teach the illustrated “connectors” or a “detachable connection.” Instead, the Office Action argues that it would have been obvious to make this modification. Perhaps in light of the claims in this application, but clearly not obvious to Rumbut, who teaches away from this modification when it states that maintaining the coolant distribution system integrity is important. (Col. 3, lines 56-57) There appears to have been absolutely no thought in Rumbut to making pump 250 anything but a permanent fixture with cabinet 200.

Rumbut also does not teach a rack into which both cooled modules and cooling modules can be inserted. Component 250 is not illustrated as being **mountable** in cabinet 200 as claimed.

Rumbut also does not teach “operable control” between cooled modules. Rumbut teaches merely “liquid communication” between modules. This liquid communication does not establish operable control as claimed and described. Data cables, an electrical interface, a bus, or some similar item to connect the electronic components on the cooled modules would be required to provide the claimed operable control since the flowing fluid is unlikely to be able to carry the electrical signals involved in operable control.

Rumbut also does not teach multiple, interchangeable cooling modules that can be selectively connected as claimed and described.

Official Notice

MPEP §2144.03 speaks directly to “Official Notice”. This section counsels that only “in limited circumstances is it appropriate for an examiner to take official notice of facts not in the

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record or to rely on 'common knowledge' in making a rejection." MPEP §2144.03 Official Notice has been injudiciously applied in this Final Office Action. For example, there is nothing in the record that indicates that pipes 212 and 218, which are permanently connected to pump 250, should be severed from the assembly and reconfigured with connectors. Indeed, Rumbut appears to counsel against this type of tampering when it recites that it "is important that the integrity of the entire coolant distribution system be maintained for several reasons." (Col. 3, lines 56-57). Maintaining the integrity of the coolant distribution system may be imperative in the naval applications for which Rumbut was designed.

Independent Claim 21

Claim 21 was rejected under 35 U.S.C. §103(a) as being anticipated by Rumbut. Claim 21 is directed to a system that includes one or more detachably connected liquid cooling module(s). Portions of claim 21 are provided below, and an element by element analysis of these portions proves that Rumbut does not render the claim obvious because it provides for neither multiple cooling modules nor detachable cooling modules.

In describing the liquid cooling modules, claim 21 reads:

"one or more liquid cooling modules, a liquid cooling module including:

one or more connectors attached to the liquid cooling module, the connectors configured to provide one or more detachable connections between the liquid cooling module and the liquid transporting means..."

The liquid transporting means in Rumbut are pipe 212 and pipe 218. The liquid cooling module in Rumbut is unit 250. There is no connector attached to module 250. There is no detachable connection between module 250 and pipe 218 or pipe 212. Since Rumbut wants to create one fixed cooling unit in which fluid integrity is maintained, there is no motive to modify Rumbut to add the missing connectors to produce the missing detachable connections to destroy fluid integrity.

In Rumbut, module 250 would be pre-engineered to meet the maximum cooling capacity required for unit 200, and thus there would be no motive to ever swap it out for a different unit. All of unit 200 and 250 would be replaced in the naval ship into which the system would be

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built. Replacing just unit 250 would compromise the integrity of the coolant distribution system, which is expressly prohibited by Rumbut.

Concerning the liquid cooling module being detachably connected, the Office Action identifies elements 212 and 218 as being connectors that could be reworked to provide the claimed detachable feature. The application defines "detachable connection" as:

[a] "detachable connection", or a connection by which entities may be "detachably connected", is one that facilitates attaching and detaching a first entity to a second entity. For example, a hose that is screwed onto a spigot is detachably connected. Similarly, an electrical receptacle configured to receive an electrical plug provides a detachable connection for the plug.

Thus, elements 212 and 218 are not connectors, they are pipes that are permanently integrated into an assembly including a pump 250 and a cabinet 200. There appears to be no way to temporarily disconnect either 212 or 218 from either 250 or 200. Any disconnection would appear to be permanent. Thus these elements do not anticipate a "detachable connection" that facilitates logically decoupling liquid cooled modules, liquid cooling modules, and the supporting structure (e.g., rack) into which the cooled modules and cooling modules can be placed. Finding the reference lacking, the Office Action relies instead on Official Notice.

On page 2 the Office Action asserts that:

[d]etachability is a well known property of many systems in both this art and many others. The benefits of detachable parts are so well known that they can be seen everywhere, the door knob to the door, memory from computers, the air conditioning unit from the vents, and even in the Rumbut patent, the modules from the cooling system.

Yet the Office Action provides no citation to any portion of the reference that suggests the desirability of modifying assembly 200, 212, 250, 218, to make module 250 detachably connected, or that provides any motivation to do so. Similarly, Rumbut makes no mention of changing 250, 212, or 218 in the suggested manner. This is particularly poignant since Rumbut clearly knew how to make things detachably connectable using, for example 109 and 118 and yet chose not to do so with respect to 250. Indeed, Rumbut cautions against taking actions that would compromise the integrity of the coolant distribution system. Hacking out pump 250 to

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weld in a different pump would clearly impact the integrity of the coolant distribution system. There is simply no motivation to modify the reference, and doing so would destroy a critical element of the reference, fluid integrity. For at least this reason claim 21 is not obvious and is in condition for allowance.

Claim 21 also reads, in pertinent part:

“where the one or more liquid cooling modules and the one or more sealed electronics modules are separate modules that can be **selectively connected together** by the one or more detachable connections to establish liquid communication therebetween.”

In one embodiment, this element describes how multiple liquid cooling modules can be connected together to multiple cooled modules using the detachable connections. In Rumbut there is one cooling module and only one cooling module. There is no way in Rumbut to attach a second cooling module (e.g., 250), particularly while maintaining the integrity of the cooling fluid.

Since claim 21 recites features not taught or suggested by the reference, claim 21 patentably distinguishes over the reference and is in condition for allowance. Thus, dependent claims 22-28, which depend from claim 21, are similarly not obvious.

Claim 22

Claim 22 recites that sealed electronics modules can be dynamically **operably connected** to each other. The Office Action asserts that Rumbut teaches that electronic modules are **operably connected** because “operable control is established with the valve control of the physical liquid communication flow” (page 3). This is incorrect. Putting two modules in **fluid communication** does not make them “**operably connected**” as described and claimed. The definition reads:

[a]n “operable connection”, or a connection by which entities are “operably connected”, is one in which signals, physical communication flow, and/or logical communication flow may be sent and/or received. Typically, an operable connection includes a physical interface, an electrical interface, and/or a data interface, but it is to be noted that an operable connection may include

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**differing combinations of these or other types of connections
sufficient to allow operable control.**

The Office Action is correct that fluid may flow between two modules. However, this fluid flow does not establish an operable connection. The liquid communication provides for flow of neither signal, physical communication, nor logical communication. For this additional reason this claim is not obvious and is in condition for allowance.

Claim 23

Claim 23 recites that electronics modules are **"sealed with respect to electromagnetic interference."** The Office Action asserts that electronic modules are sealed since they reside in an enclosure that is sealed. This logic is flawed and misses the point of sealing each module individually. In Rumbut, a module in slot 206 could interfere with a module in slot 203 because they are not sealed with respect to each other. While they may be protected from interference or conditions external to enclosure 200, they are not protected from interference or conditions inside enclosure 200. This illustrates the difference between a sealed module and a module sealed into an enclosure. This is similar to the difference between putting a leftover sandwich sealed in a Tupperware container in the fridge and simply putting the leftover sandwich in the fridge. Using the logic of the Office Action, both are "sealed" by the fridge. However, only one is protected from the environment inside the fridge. Claim 24 has been amended to make this element more clear. However, claim 23 remains not obvious and in condition for allowance because the individual modules are sealed while Rumbut only teaches sealing all the modules into one enclosure.

Claim 24

Claim 24 has been amended to make more clear that electronics modules are **"individually sealed"** and thus are protected from each other. In Rumbut, enclosure 200 can only protect a module from the environment external to enclosure 200, not the environment inside enclosure 200. Thus, enclosure 200 is more like a fridge and less like Tupperware. This amendment does not add new matter to the application and does not require a new search. Consider paragraph [0033], which reads, in pertinent part:

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"Sealed", with respect to attributes like electromagnetic interference can mean that a percentage of electromagnetic waves that could otherwise affect one or more electronic components in the electronics module 300 are prevented from doing so. Additionally and/or alternatively, "sealed" with respect to electromagnetic interference can mean that electromagnetic magnetic waves generated by the electronics module 300 can be prevented from leaving the electronics module 300 and affecting other components.

This paragraph provides support for the clarification that a cooled module can be individually sealed to prevent interference with other cooled modules. Enclosure 200 does not provide this individual sealing.

Claim 27

Claim 27 recites that the liquid cooled modular electronics system includes a rack configured to mount sealed electronics modules and liquid cooling modules. To make claim 27 obvious, both the purported electronics modules (e.g., 100) and the purported cooling module (e.g., 250) would need to be mounted in enclosure 200. Consider that paragraph 34 reads: "with the detachable connections, the electronics module 300 and the cooling module 310 may be repositioned in the rack." Rumbut describes a cabinet into which electronics modules may be placed. Rumbut does not describe how module 250 could be inserted into enclosure 200. Furthermore, Rumbut does not describe how multiple cooling modules could be inserted into enclosure 200.

The Office Action simply concludes that cabinet 200 can mount pump 250. "Rumbut teaches a rack (Fig. 2, element 200) configured to mount the one or more sealed electronics modules and the liquid cooling module." This conclusion lacks any explanation of how this modification would be achieved. This conclusion also lacks any reference to any motivation as to why the modification would be made. While cabinet 200 can clearly mount multiple packs 100, it is unclear how cabinet 200 could ever mount pump 250. Indeed, from the figures and description, it appears impossible to disconnect pump 250 and insert it into cabinet 200. For this additional reason this claim is not obvious and is allowable.

Claim 28

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Amended claim 28 recites that the electronics system includes two or more liquid cooling modules arranged in a redundant, fail-over system. Rumbut describes only a single cooling module 250. To be arranged in a redundant, fail-over system, there must be two or more cooling modules. Thus, this claim has been amended to read "two or more". Changing "one or more" to "two or more" does not introduce matter and does not require a new search.

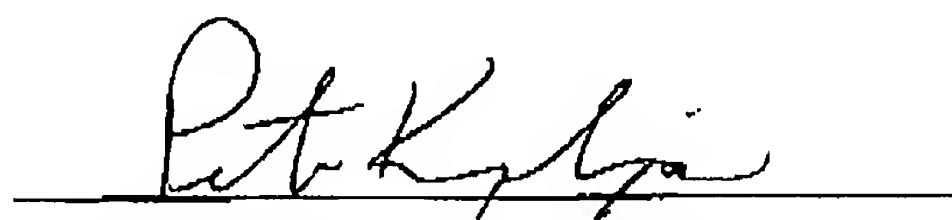
The Office Action takes Official Notice that adding a failover system to cabinet 200 would be obvious. However, this purportedly simple and obvious modification would require assembly 250, 212, 200, 218 to be dismantled, another pump 250 to be welded in, additional plumbing to be welded in, control logic to perform failover processing to be added in, and additional plumbing to prevent backflow, vapor lock, and so on, to be welded in. This goes well beyond an "obvious" modification. And still the Office Action provides no citation to any portion of Rumbut that provides any motivation for performing any of this work and still fails to describe how prying apart the system to make the proposed modification would not destroy the integrity of the coolant distribution system. Thus, this rejection is improper and should be removed, leaving this claim not obvious and in condition for allowance.

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Conclusion

For the reasons set forth above, claims 21-28 patentably and unobviously distinguish over the references and are allowable. An early allowance of all claims is earnestly solicited. Additionally, Applicant's counsel hereby requests a telephonic interview to discuss the amendments made after final. The Examiner can reach Applicant's counsel at the telephone number provided below. Counsel suggest that the agenda for the telephonic interview include discussing "detachably connected", "operably connected", "individually sealed", "two or more" cooling modules, and how the integrity of the coolant distribution system could be maintained if the proposed modification were made.

Respectfully submitted,



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